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Macroeconomic Adjustment and the Labor Market in Four Latin American Countries

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and
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Expanding wage differentials during adjustment imposes a greater burden on the poorest workers, making adjustment policies less sustainable politically. And nominal devaluation is probably ineffective with a segmented labor market. Deregulating the labor market makes adjustment programs more effective and equitable.

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Implicit in standard macroeconomics of adjustment is the assumption of well-integrated labor markets that are responsive to relative prices.

But segmentation of the labor market is usually said to be an important source of labor market rigidities. In particular, if segmentation involves different degrees of real wage rigidity among different groups in the labor force, nominal devaluation may be ineffective and inequitable in its impact.

Lopez and Riveros use a model of labor market segmentation in which regulations are necessary to distinguish between the formal and informal sectors.

Using standard econometric techniques to estimate four simultaneous equations, they examine the effect of devaluation on relative wages in Argentina, Chile, Colombia, and Uruguay.

They found that formal wages are more responsive than informal wages to inflation and that devaluation of the exchange rate, by increasing the wage gap, is a source of sluggish labor mobility.

They also found that expanding wage differentials during adjustment imposes a greater burden on the poorest workers, making adjustment policies less politically sustainable.

In addition, they found evidence to support the hypothesis that nominal devaluation would probably be ineffective with a segmented labor market.

This paper is a product of the Trade Policy Division and the Macroeconomic Adjustment and Growth Division, Country Economics Department. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Luis Riveros, room N11-061, extension 61762 (41 pages with tables).

Macroeconomic Adjustment and the Labor Market in Four Latin American Countries*

by
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I. Introduction

Macroeconomic adjustment typically relies on policies involving devaluations of the exchange rate to transfer productive resources from non-tradable to tradable industries. For a nominal devaluation to succeed in real terms -- i.e., achieving a real devaluation in terms of a permanent change in the relative price of tradable to non-tradable goods -- use of expenditure reduction policies and existence of wage flexibility and labor mobility are deemed necessary. This indicates the importance of the labor market structure as a factor determining the effectiveness of the macroeconomic policy.

The standard macroeconomics of adjustment critically hinges on the assumption of efficient and well integrated labor markets, which are responsive to relative prices. However, an already vast literature has provided evidence in support of the existence of segmented labor markets (SLMs) in LDCs, and suggested that segmentation create rigidities in the employment and wage response to the macro policy [PREALC/ILO (1985)][1]. Segmentation may involve different degrees of real wage rigidity across labor force groups, increase the formal/informal wage differential during the adjustment, reduce labor mobility and harm the political sustainability of the macroeconomic policy. In short, a segmented labor market may cause nominal devaluations to be relatively ineffective in reaching a real devaluation, an important factor in explaining incomplete structural adjustment.

If a devaluation increases the formal/informal wage gap then the burden of the adjustment would be carried mostly by the poorest segments of the labor force. This tends to support the idea that adjustment programs are distributionally unfair. However, in the framework of the SLMs theory no a-priori prediction on the effect of adjustment policies on the formal/informal

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[1]. For a discussion on the issue, see Lopez & Riveros (1989)

wage gap is possible. That effect would depend upon the wage elasticities, other parameters linked to market intervention and the extent of the segmentation problem (Lopez & Riveros, 1989). For instance, the formal/ informal wage gap may be expected to increase if wage indexation prevails in the formal sector while fully flexible wages exist in the informal sector. Hence, the actual effect of exchange rate policies on the formal/informal wage differential is an empirical issue which requires a model allowing for simultaneous determination of aggregate expenditures and wages.

In this paper we use a model that allows for segmentation in the labor market. The role of government intervention is crucial in distinguishing protected and unprotected segments of the labor market which are, in turn, related to the traditional taxonomy of formal/ informal sectors. The model concentrates on the effect of devaluation on relative wages and on the existing linkages among real wages, prices and aggregate expenditures. We apply standard econometric techniques to estimate four simultaneous equations which connect wages in the formal and the informal sectors, the price of non-tradables, and aggregate expenditures to a set of policy variables, such as the exchange rate, minimum wages and non-wage costs of labor. The analysis is applied to four Latin American countries (Argentina, Colombia, Chile and Uruguay) which are apparently subject to labor market segmentation and where important structural adjustment programs have recently been implemented. In general, our results are indicative of the importance of segmentation in connection with exchange rate policies. In particular, we found that formal wages are more responsive to inflation and that exchange rate devaluations increase the wage gap, thus being a source of poor labor mobility.

The paper is organized as follows: In the second section we review the

standard theory connecting labor market structure and the potential effect of macroeconomic adjustment policies. A model that allows for simultaneous determination of wages, prices and income under the hypothesis of segmented labor markets is discussed. In the third section we cover the empirical version of the model and we examine general economic information concerning the countries included in the study. In the fourth section we present the empirical estimates of the multi-equation model. Finally, in section five we include a brief summary and discuss some policy implications.

2. Labor Market Segmentation and Adjustment.

2.1. The Issue

At the beginning of the 1980s most LDCs faced unsustainable trade deficits and severe internal macroeconomic imbalances. The situation prompted profound adjustments in which nominal devaluations and expenditure reduction occupied a central role. Comparative cross-country studies have revealed that deregulation of internal markets is a crucial factor in explaining the varying degree of success of LDCs in responding to macroeconomic policies (Corbo & Sturzenegger, 1988). This finding suggests that deregulation of the labor market would also be a key factor in improving the supply response to macroeconomic adjustment policies.

The recent adjustment experience in LDCs indicates that poor inter-sectoral labor mobility in urban areas is a relatively common problem (Fallon & Riveros, 1989). The negative effect of industry-specific human capital on labor mobility (Katz, 1986) may be a reasonable explanation. However, the existence of relatively high geographical labor mobility and a burdensome system of institutional regulations in urban labor markets (Fallon & Riveros,

1989) strongly suggests that labor market segmentation may be a critical factor in explaining the presence of higher open unemployment under adjustment policies. The standard macroeconomic analysis relies upon the assumption of smooth labor markets, in which labor mobility responds to changes in relative wages [for a review, see Corbo et al (1988), Edwards (1988)]. Hence, adjustment policies result in a drop in real consumption wages across the board, a drop in wages in terms of the price of tradables and in a subsequent reallocation of labor from non-tradables to the tradable sector. Analyses of wage indexation and minimum wages in the context of macro adjustment have usually assumed homogeneous labor markets [Fischer(1984), Lal (1985)] or partial coverage in terms of industries [Edwards, 1988]. Yet, the issue of SLMs has not been explicitly included in macroeconomic analyses. Central questions in this regard are: To what extent is a SLM a factor potentially hindering the success of stabilization-cum-structural adjustment?; What are the relevant links between effectiveness of nominal devaluations and a SLM?; What alternative policies may be used to make the labor market more responsive?.

2.2 The Model

The view adopted here is that segmentation is mainly a result of government intervention and regulations that benefit only part of the labor force. The protected (formal) sector is formed by large firms, covered by several regulations on wages and employment[2]. The unprotected (informal) sector is characterized by free entry and by fully flexible, market-clearing wages. Regulations cannot be enforced in the informal sector because of the

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[2]. This is the sector where regulations can actually be enforced by the administrative authority. These regulations normally include non-wage costs of labor, wage indexation rules, job security and minimum wages.

small size of the average firm. We assume that the formal sector produces both tradables and non-tradable goods using skilled and unskilled labor, while the informal sector produces only non-tradable goods with only unskilled labor[3].

The wage rate of skilled labor (Ws) is determined in the formal sector. Market clearing conditions determine a competitive "notional" wage (Ws*) that depends upon prices of tradables (Pt), prices of non-tradables (Pn) and the minimum wage (MW), which is the wage actually paid to unskilled labor in the formal sector[4]. The effective wage for skilled labor is the notional wage modified by a distortionary factor (θ >1) which is related to government and union intervention[5]. The existence of this distortionary factor implies that a portion of skilled workers may remain openly unemployed.

The demand for skilled labor is derived from profit maximization and the usual convexity assumptions. The total demand for skilled labor corresponds to the private sector demand function plus public sector employment (Lg),

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[3]. The concept of skills we use refers to both general and specific human capital. In the empirical exercise presented below, we employ the concept of general human capital (schooling). The basic assumptions of this model reflect the tradition of the SLMs approach, according to which the informal sector is mainly concentrated in services (i.e. production of non-tradables) and characterized by relatively low labor productivity.

[4]. We assume the law of one price such that the domestic price of tradables is equal to international prices multiplied by the nominal exchange rate.

[5]. In another paper (Lopez & Riveros, 1989b) we generalize this assumption by postulating that $\ln(ws) = \ln(w^*) + \theta x[\delta_0 + \delta_1 \ln(w^*) + \delta_2 \ln(MW)]$, where the "x" indicates the product between θ and the term between brackets represents a functional form for the distortionary factor. This specification implies that if θ is zero, $w=w^*$, and that w is increasing in w^* and θ.

which is assumed exogenous[6]. Naturally, the labor demand depends on effective rather than notional wages:

$$Ds = Ds(Ws, MW, Pt, Pn; Kf) + Lg \qquad [1]$$
$$\quad\; - \;\; ? \;\; + \;\; + \;\; +$$

Where Kf is the capital stock in the formal sector of the economy.

The supply of skilled workers (Ss) depends upon the aggregate CPI (p) which is, in turn, a weighted average of tradable and non-tradable prices. Ss also depends upon the effective wage rate (Ws) because individuals value the benefits associated with prevailing non-wage costs[7].

$$Ss = Ss(Ws, p, N) \qquad [2]$$
$$\quad\; + \;\; - \;\; +$$

where N is working age population.

Both the labor demand and supply are homogeneous degree zero in wages and prices. The notional equilibrium wage is the wage rate that would prevail in absence of unemployment of skilled workers. Thus, this notional wage rate is obtained by equating [1] and [2]:

$$Ws^* = Ws^*(Pt, Pn, MW, Kf, Lg, N) \qquad [3]$$
$$\quad\;\; + \;\; + \;\; ? \;\; + \;\; + \;\; -$$

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6. An alternative is to consider public sector employment to depend upon the operational public sector deficit. This would allow us to account for the effect of fiscal measures usually included in adjustment programs. We will introduce the role of fiscal expenditures on the demand side of the model, thus affecting prices and, indirectly, employment and wages.

7. Non-wage costs are associated with outlays represented by things fringe benefits, social security, vacations days, etc., whose benefits always accrue to the worker.

The relationship between notional and actual wages is:

$$Ws = \theta Ws^* \qquad \theta > 1 \qquad [4]$$

θ is related to both government and union intervention in wage setting. We can represent a dynamic version of [4] in which the policy parameter θ is linearly linked to a variable B -- representing government intervention in the form of non-wage costs of labor -- and a variable $(Pt-P^{e}t,t-1)$ which intends to capture ex-post wage indexation, where $P^{e}t,t-1$ is the price level in period t-1 to obtain in period t (Fischer, 1984)[8]. Existence of the factor θ is likely to produce open unemployment among skilled workers.

The wage rate for unskilled labor varies across the formal and informal sectors. We assume that the minimum wage (MW) is binding for unskilled labor used in the formal sector (Luf)[9]. In the informal sector the equilibrium wage (Wu) is determined by supply and demand. Both the supply (Su) and the demand (Dui) of unskilled labor in the informal market are homogeneous degree zero in wages and prices. The relationship between the formal and the informal segment in the market of unskilled labor follows Harberger (1972): given the formal sector demand for unskilled labor and the prevailing MW, there is an effective labor supply to the informal sector (S*). The market equilibrium between the prevailing labor demand (Dui) and the effective labor supply to

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8. Thus, proportional changes in θ (θ) may be linearly related to changes in government intervention (B) and in a variable reflecting indexation, such as in: $\theta = a + b\ B + c(Pt-Pt^{e}t,t-1) + E$, where "E" is a random term. This specification will be empirically tested.

9. Unskilled labor may be assumed to be a gross substitute of skilled labor in the formal sector. Hence, we would expect a positive relationship between them. However, we do not impose any a priori constraint on the sign of this relationship.

the informal sector (Lu) determines the informal sector equilibrium wage (Wu).

$$S^* = Su(MW, p, N) \quad (+ \; - \; +) \qquad [5]$$

$$Dui = Dui(Wu, Pn, Ki) \quad (- \; + \; +) \qquad [6]$$

In considering the demand for unskilled labor in the formal sector (Duf), and by also assuming that the market represented by eqs. [5] and [6] clears, we can arrive at the following equilibrium condition:

$$Dui\,(Wu, Pn, Ki) = (1 - Z)\, S^*(MW, Pt, Pn, N) \qquad [7]$$

where $Z = Duf(MW, Ws, Pt, Pn, Kf)/S^*(MW, Pt, Pn, N)$, is the proportion of unskilled workers that are able to find a job in the formal sector. It is assumed that the supply of unskilled labor depends on the MW, which is a rate prevailing only in the formal sector. Not all workers, however, are able to find a job at the going MW in the formal sector. A proportion of those unable to find a job in the formal sector are willing to accept the lower wage which exists in the informal sector. The rest would prefer to remain in the market waiting for a vacancy in the formal sector. This is the segment of unskilled labor that remains as quasi-voluntarily unemployed.

The following implicit equation reflects the equilibrium (informal sector) wage for unskilled labor:

$$Wu = Wu(Ws, MW, Pt, Pn, K, N) \quad (? \; - \; + \; + \; + \; -) \qquad [8]$$

The function Wu is homogeneous degree one in wages and prices.

The price of non-tradables is determined endogenously through demand-supply conditions. The supply of non-tradables is:

$$Sn = \underset{+}{Sn}(\underset{+}{Pn}, \underset{-}{Pt}, \underset{-}{Wu}, \underset{-}{MW}, \underset{-}{Ws}, \underset{+}{K}) \qquad [9]$$

[9] is homogeneous degree zero in prices and wages. The demand function is writen as follows:

$$Dn = \underset{-}{Dn}(\underset{-}{Pn}, \underset{+}{Pt}, \underset{+}{Yd}) + \mu G \qquad [10]$$

where Yd correspond to disposable income, G is government expenditures and μ ($0 < \mu < 1$) is the proportion of government expenditures used in non-tradable goods and services. The function Dn() is homogeneous degree zero in prices and income. The following expression corresponds to the equilibrium price of non-tradable goods in the economy, which are competitively determined:

$$Pn = \underset{+}{Pn}(\underset{+}{Pt}, \underset{+}{Wu}, \underset{+}{Ws}, \underset{+}{MW}, \underset{-}{K}, \underset{+}{G}, \underset{+}{Yd}) \qquad [11]$$

which is linearly homogeneous in wages and the price of tradables.

The model is completed with an output equation, which basically assumes that output in the economy is supply determined. Although this simplification allows us to concentrate the analysis in labor market issues, it may significantly afrect the explanatory power of the model. On the other hand, if we specify additional equations in connection with the expenditure and

monetary sectors of the economy, this would increase the complexity of the model adding little to clarify the key relationships in connection with labor markets. Hence, output will be simply expressed as the sum of the value added in tradable and non-tradable industries, thus being a function of prices, wages and the stock of capital:

$$Y = Y(Pn, Pt, MW, Wu, Ws; K) \qquad [12]$$
$$\quad\; + \;\; + \;\; - \;\; - \;\; - \;\; +$$

This function is homogeneous degree one in prices and wages.

2.3 The Working of the Model[10].

The market for skilled labor is graphed in Panel A (Figure 1). DL and DN correspond to the demand functions for skilled labor in the production of tradables and non-tradables, respectively. The graph assumes a given supply of skilled workers equivalent to the distance OA. Wages are expressed in terms of the price of tradables. The unemployment of skilled labor for an effective wage level W, is E-E'. If there were full flexibility of wages[11], a devaluation would cause a drop in DN (to DN') and in the effective wage level (from W to W'), thus implying a shift of labor from non-tradable to tradable production equal to L-L'.

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[10]. Further discussion on the theoretical properties of this model is presented in Lopez & Riveros (1989).

[11] Full wage flexibility may take place regardless of whether distortion exists. Wage flexibility in this context implies that the distortion is constant, thus preserving the wedge between market clearing and actual wages.

The unskilled formal market is depicted in panel B (Figure 1), where MW is expressed in terms of tradables. Given MW, the prevailing demand for unskilled labor determines the employment level in the formal sector (Luf). The effect of the MW on the demand for skilled labor is a-priori unknown, its effect depending on the complementary or substitution links existing between skilled and unskilled labor in the formal sector.

Panel C in Figure 1 depicts the informal segment of the labor market. Su shows the total labor supply of unskilled workers as a function of MW. The supply of unskilled labor to the informal sector (S*) is related to Su according to the prevailing MW: for any given level of MW, S* is equal to the total supply Su less the prevailing employment of unskilled labor in the formal sector. The equilibrium wage in the informal sector is Wu, and the quasi-voluntary unemployment is equal to (Lui - Lui').[12] Wu is expressed in terms of tradables; thus, a devaluation causes a drop in Dui to Dui' which, for a given labor supply, implies a decline in the equilibrium wage from Wu to Wu'[13].

Consider the effect of a nominal devaluation accompanied by a fiscal/monetary policy that keeps nominal aggregate demand constant. If both Ws and MW are fixed in terms of the price of tradables, production of tradables (in the formal sector) would remain unchanged. Since the skilled labor demand from the non-tradable sector (in the formal market) would fall due to

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[12] Quasi-voluntary unemployment correspond to those with supply price below the MW but above the prevailing equilibrium wage in the informal sector.

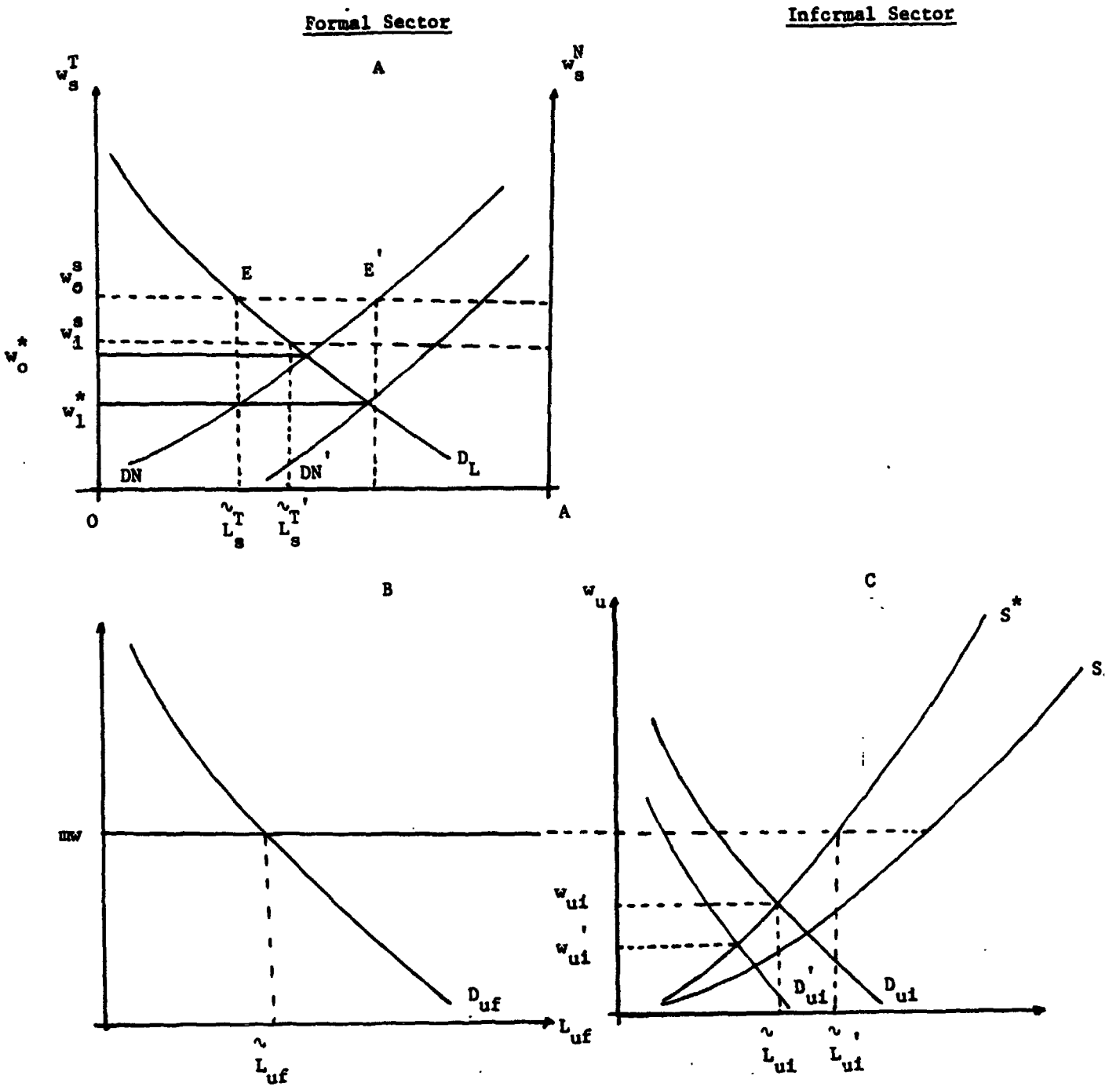
[13]. A nominal devaluation will also cause the MW (in terms of tradables) to decline. However, the employment effect of a reduction in the MW will depend upon labor mobility in the skilled market. Thus, if wages are more rigid in this market, employment of unskilled labor in the formal sector will go up to the extent that there is substitution between skilled and unskilled labor thus countering the negative impact of a nominal devaluation on Wu.

devaluation, employment of skilled labor in the non-tradable industry would also decrease. Thus, output of non-tradables in the formal sector would be reduced. The demand for unskilled labor from the formal sector would also fall due to the decline in production of non-tradables. This, in turn, would expand the effective supply of unskilled labor to the informal sector. This would reinforce the decline of unskilled wages in the informal sector, which results from the drop of labor demand in the informal sector due to the devaluation. Quasi-voluntary unemployment of unskilled workers would necessarily increase. In summary, output of tradables remains constant, output of non-tradables will fall in both sectors, real wages of unskilled labor decrease (thus increasing the formal/informal wage gap) and unemployment of both skilled and unskilled workers would increase. In this case, the devaluation is completely ineffective and contractionary.

In the more realistic case where formal sector wages (Ws and the MW) are indexed to the total CPI instead of the price of tradables, the effect of a devaluation is, of course, less contractionary and more effective in promoting tradable production. If the indexation is binding, Ws will fall by less than what would be required to maintain the original level of unemployment. Thus, unemployment among the skilled would increase. Output of non-tradables would still fall but, output of tradables would increase, so the devaluation is less contractionary. The demand for unskilled workers from the formal sector would still decrease (by a lesser extent), but since MW falls it is not clear whether the effective supply of unskilled workers to the informal sector will increase. However, output and real wages in the informal sector will decrease. In this case, all qualitative results from the previous analysis still hold, although the quantitative significance is milder.

Figure 1

The Structure of the Labor Market



Central issues for the empirical analysis are the response of formal and informal wages to a nominal devaluation, and the response of the price of non-tradables to a nominal devaluation. The stickier real wages are in the formal sector, the more likely a nominal devaluation will negatively affect real wages in the informal sector and thwart intersectoral labor mobility. In contrast, a smoothly functioning labor market would produce declining wages in terms of tradables for both skilled and unskilled labor, thus facilitating the transfer of labor across industries. Similarly, the larger the degree of distortion in the formal sector, and thus the lower the response of labor markets to macro policies, the more ineffective a nominal devaluation would be in achieving a change in the relative price of tradables to non-tradables.

3. Empirical Analysis of Labor Market Segmentation

3.1 The Econometric Model.

The model discussed above originates four estimating equations: wages for skilled (Ws) and for unskilled (Wu) labor; price of non-tradables (Pn) and aggregate income (Y). The two former will be referred as formal and informal wages, respectively. The structural empirical system is the following:

$$Ws = \alpha 0 + \alpha_1 B + \alpha_2 Pt + \alpha_3 Pn + \alpha_4 Mw + \alpha_5 K + \alpha_6 Lg + \alpha_7 N + V_1$$

$$Wu = \beta_0 + \beta_1 Pt + \beta_2 Ws + \beta_3 Pn + \beta_4 MW + \beta_5 K + \beta_6 N + V_2$$

$$Pn = \tau_0 + \tau_1 Pt + \tau_2 Wu + \tau_3 Ws + \tau_4 MW + \tau_5 K + \tau_6 Yd + \tau_7 G + V_3$$

$$Y = \delta_0 + \delta_1 Pt + \delta_2 Pn + \delta_3 Ws + \delta_4 Wu + \delta_5 MW + \delta_6 K + V_4$$

Where Vi (i=1..4) are random terms with zero mean and constant variance[14]; B is the ratio of non-wage costs of labor to wages -- which we use

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[14]. There are not restrictions on the matrix of variances and covariances of the system, as there may be correlation between the errors pertaining to any pair of equations.

as a proxy for θ[15]. K is the aggregate capital stock, which we used instead of the sectoral capital stock. The model will be estimated with 2SLS and 3SLS, thus also accounting for correlation among the error terms Vi. The variables will be expressed in rates of change, so that the parameters are interpreted as elasticities[16]. The reduced form will provide estimates of the "total" effect of changes in exogenous variables, thus complementing the information given by the estimated structural parameters[17].

The system displayed by the four empirical equations corresponds to the "equilibrium" form of the model -- i.e. indicating equilibrium prices. We do not impose any constraint with regard to the structural underlying equations, nor will we attempt to recover their structural parameters. The estimates of these four equations are deemed enough to test the empirical adequacy of the model and the effect of nominal devaluations on wages and the price of non-tradables. From the empirical viewpoint this is the most viable alternative given the existence of more reliable and comparable data on wages than on employment of skilled and unskilled labor.

The equations of the structural form are either exactly identified or overidentified according to the order conditions. Besides the exogenous variables included, instrumental variables (inflation, money stock, nominal exchange rates, taxation, terms of trade) was also used in the estimation of the model. The choice of instruments was limited to the availability of

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15. In the empirical estimation we also included a variable reflecting ex-post cpi indexation.

16. Thus, the change in capital stock is simply the aggregate investment.

17. The reduced form system is derived from the specification of the structural set of equations presented above. In the empirical part we introduce some changes in this specification.

comparable information in a time series form. Lags were also used in estimating several versions of the model, as for instance with regard to the role played by the price of tradables and the investment in the model. Some revisions of this general structure were effected according to the needs of the empirical analysis, so there are some deviations from the general specification.

In the above discussion of the model we defined certain restrictions with regard to the structural parameters. These restrictions are reproduced below, and they will be empirically tested[18]:

$$\alpha_2 + \alpha_3 + \alpha_4 = 1 \; ; \qquad \beta_1 + \beta_2 + \beta_3 + \beta_4 = 1 \; ;$$

$$\tau_1 + \tau_2 + \tau_3 + \tau_4 = 1; \qquad \delta_1 + \delta_2 + \delta_3 + \delta_4 + \delta_5 = 1$$

3.2 The Case Studies

The countries included in this study (Argentina, Colombia, Chile and Uruguay) are at relatively similar development stages. This is suggested by similar life expectancy at birth and enrollment ratios in primary school (Table 1). The share of manufacturing GDP in total GDP -- a rough indicator of the importance of the modern sector in the economy -- also looks alike. The per capita GDP, however, displays a higher dispersion, probably due more to periods of over and undervaluation of the dollar than to key economic differences[19].

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[18]. The procedure will be to estimate the model without any constraint on the coefficients in each of the equations. We will then estimate a restricted form, thus statistically testing the validity of the homogeneity conditions.

[19]. For instance, the dollar level of per capita GDP prevailing in 1985 indicates that the four countries are at a very similar development stage.

Table 1
Social and Economic Indicators for the Chosen Countries

	1970				1980				1985			
	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru
(1)	910	340	850	980	1960	1120	2100	2810	2120	1320	1440	1670
(2)	66.6	58.9	62.2	68.7	69.2	62.9	68.7	71.3	70.3	64.9	70.4	72.2
(3)	105	108	107	112	106	128	117	106	108	117	109	110
(4)	94.3	85.8	101	104	95.6	98.9	97.7	95.5	97.6	95.0	100	103
(5)	26.5	16.0	24.7	na	22.1	17.0	21.6	22.3	27.3	16.3	20.4	22.4

Definitions: (1) Per capita GDP (Current Dollars); (2) Life Expectancy at Birth; (3) Schooling Enrollment Ratio (Primary); (4) Production Per-capita of Food (1979-81=100); (5) Manufacturing GDP as a proportion of total GDP. Arg: Argentina; Col: Colombia; Chi: Chile, Uru: Uruguay.

Sources: World Tables 1987, The World Bank, 1988, and Bank Socio Economic Data (BESD).

The four countries used import substitution strategies (ISSs) since the 1940s, although Colombia abandoned it in the late 1960s (IBRD, 1984). Considerable government intervention in goods and factors markets was mostly a corollary of the failure of the ISS. As time passed, the industrialization expected to result from the ISS created instead progressive macro imbalances without providing more wages and employment [Corbo, 1986], resulting in a surge in interventionism. The more obvious cases of this surge were Chile in 1970-73 and Argentina in 1973-75.

Data in Table 2 indicate another similarity among the four countries: chronic economic instability. Over the period 1960-85, fluctuating GDP growth rates, a varying but normally low proportion of output invested domestically, widely fluctuating real exchange rates and persistent inflation characterized these countries. Yet, some differences in the degree of instability appear upon closer inspection, particularly in the case of Colombia, which does not

have an inflationary history and has not experienced comparable declines in aggregate economic activity nor similar fiscal imbalances. On a positive note, these differences among our countries provide us with more variance for the statistical analysis.

During the 1970s, the four countries made efforts towards building up more outward oriented economies. They also attempted to reduce the economic size of the state, thus eliminating a source of inflation and intervention throughout the economy. This reform effort was notable in the southern cone countries, particularly Chile. To a different extent but following a quite similar philosophy, these countries pursued trade liberalization, market deregulation, a large financial opening, along with stabilization, demand management policies and use of exchange rate policies to cut inflation down [Edwards & Edwards (1988), Corbo & De Melo (1987)]. Overvaluation, persistent fiscal disequilibrium and a rapid relaxation of restrictions on the capital account produced unsustainable trade deficits and external indebtness (Barandiaran, 1988). In Colombia during the second half of the 1970s, the coffee boom and exogenous capital inflows boosted reserves and the debt-servicing capacity of the country, also supporting indebtness when the price hike was over. As a result of these policies, Colombia also needed macro adjustment in the early 1980s.

The reduction in domestic expenditures in 1983-84 was substantial in all the countries, but Colombia, while real devaluations fulfilled a key role in the process of adjustment. Since then the adjustment has been slow, with varying degrees of success. Chile and Colombia are the countries where a more sustained recovery has taken place (Barandiaran, 1988).

Table 2
Economic Indicators for the Chosen Countries

	1. GDP Growth Rate				2. CPI Inflation				3. Fiscal Deficit/GDP			
	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru
1961	10.1	5.1	4.8	3.0	14.0	8.7	7.0	22.5	1.4	2.0	4.5	na
1965	11.6	3.5	0.8	1.2	28.5	19.8	31.3	56.5	2.2	0.6	4.1	3.6
1970	6.4	9.3	2.1	6.5	13.6	6.8	32.6	17.0	0.8	0.9	2.7	1.4
1975	0.2	2.3	-12.9	5.9	182.3	22.9	379.2	81.4	12.3	0.2	2.6	4.4
1980	2.4	4.1	7.8	6.0	100.8	26.5	35.1	63.5	4.8	1.8	-3.1	0.0
1981	-6.8	2.3	5.5	1.9	104.5	27.5	19.7	34.0	5.4	3.0	-1.7	1.5
1982	-4.6	0.9	-14.1	-9.4	164.8	24.5	9.9	19.0	8.7	1.6	2.3	9.1
1983	2.8	1.6	-0.7	-5.9	343.8	19.8	27.3	49.2	13.9	1.1	3.8	3.9
1984	2.6	3.4	6.3	-1.5	626.7	16.1	19.9	55.3	11.0		4.0	5.2
1985	-4.5	3.6	2.4	0.0	672.1	24.0	30.7	72.2	2.4		6.3	2.2

	4. Investment/GDP				5. Trade Deficit/GDP				6. Real Exchange Rate			
	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru
1961	25.0	19.2	14.6	17.9	-3.3	-1.5	-1.9	-0.5	118	100	104	103
1965	16.7	16.3	14.7	10.7	2.2	2.8	2.7	4.2	100	100	100	100
1970	21.6	20.2	16.5	11.5	1.2	-0.2	3.3	0.9	102	135	149	97
1975	25.9	17.0	13.1	13.5	-1.4	2.1	1.0	-3.0	109	137	202	88
1980	22.2	19.1	21.0	17.3	-0.9	-0.9	-2.8	-6.0	39	108	125	58
1981	18.8	20.6	22.7	15.4	0.6	-4.3	-8.2	-3.2	50	108	115	57
1982	15.9	20.5	11.3	14.4	4.9	-5.8	0.3	2.4	118	108	145	65
1983	10.6	19.9	9.8	10.0	5.7	-3.9	5.0	7.8	111	114	182	112
1984	11.3	18.7	13.6	9.9	5.1	0.7	1.5	3.7	102	131	198	122
1985	8.5	18.5	13.7	8.2	7.4	-0.1	5.3	4.2	122	155	256	132

Definitions and Sources:

(1) Yearly Growth Rate [IMF: IFS]; (2) Yearly Average Inflation [IMF: IFS]; (3) Overall Fiscal Deficit [IMF:IFS; for Chile: Central Bank, Indicadores Economicos y Sociales; for Argentina, De Pablo (1987)]; (4) Gross Domestic Investment [World Bank :BESD]; (5) Exports (fob) minus Imports (Cif) [IMF: IFS]; (6) Ratio of CPI-US the country's CPI multiplied the nominal exchange rate [Cottani(1987)].

From the view point of the labor market, the four countries also share some common characteristics. First, government intervention in wage setting is important. In Chile and Argentina the instrument most often used is indexation through government control, although in the former country there

have been some discontinuities in this policy. In Uruguay, the government intervenes in wage bargaining carried out at the national levels, thus influencing the prevailing wage structure in the formal sector. In Colombia intervention takes place mostly through non-wage cost regulations (IBRD, 1985), although the policy of sustaining an increase in real wages has also been successful. In all four countries wage intervention is also accomplished through minimum wage policies, which positively affects average wages and inflation (Paldam & Riveros, 1989). Althought MWs have declined in real terms in the southern cone (Table 3), this has not occurred with the ratio of MWs to unskilled wages, a more relevant indicator of their effect on the labor market.

Public sector employment has been used in these countries to deal with the inability of the economy to keep up with the growth of the labor force. The proportion of public sector employment to total employment is very similar in the three southern cone countries (Table 3). This ratio has been increasing in Colombia steadily way over time, while recently decreasing in the other countries. The use of public sector employment to provide a buffer for the slow growth of private sector employment is clearly suggested by the growth in public employment. This has been less marked in Colombia, but it is significant in Uruguay and Argentina [Riveros (1987, 1989), Riveros & Sanchez (1989)].

Table 3
Labor Market Indicators in the Chosen Countries

	Lg				U				Mw/Wu			
	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru
1960	11.5	1.6	7.7	na	8.5	7.4	7.4	na	100	100	100	na
1965	9.7	2.0	8.3	7.6	5.4	10.3	6.5	7.1	56	116	79	100
1970	9.1	2.7	10.1	8.5	5.2	9.9	5.7	6.6	44	107	65	89
1975	9.7	3.3	12.1	10.2	3.5	11.2	11.4	6.0	39	133	146	136
1980	8.6	4.1	8.3	9.4	2.8	10.0	13.8	6.0	30	123	99	121
1981	8.6	4.1	8.6	9.8	5.1	8.7	14.5	5.2	32	105	79	139
1982	8.5	4.1	7.7	10.2	5.5	9.3	14.8	9.3	43	110	78	136
1983	8.3	4.4	8.7	10.4	4.8	11.0	15.4	12.2	43	125	96	140
1984	8.6	4.9	8.5	10.8	4.8	13.2	15.8	11.2	36	134	85	154
1985	9.0	5.3	8.2	10.1	6.4	14.0	16.2	10.6	[illegible]	147	83	154

	Ws/P				Wu/P				Ws/Wu			
	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru	Arg	Col	Chi	Uru
1960	100	100	100	na	100	100	100	na	100	100	100	na
1965	135	123	105	100	135	129	120	100	100	96	88	100
1970	137	143	161	92	138	107	178	85	99	135	94	108
1975	160	136	70	83	158	89	99	74	102	152	71	112
1980	138	160	122	81	113	124	149	72	122	129	82	113
1981	125	171	148	89	102	150	185	62	122	114	80	131
1982	112	184	158	92	82	148	183	66	137	124	86	140
1983	125	193	116	78	121	137	121	56	103	141	96	139
1984	137	202	109	73	132	133	116	50	104	152	94	146
1985	112	184	91	81	108	126	113	58	104	146	81	140

Definitions: Lg= Proportion of Public Sector Employment (Central Government, Public Firms and regional Governments) over total employment; U= Open Unemployment rates (Number of unemployed divided by Labor Force); Mw/Wu= Minimum Wages divided by unskilled wages (Own account workers with less than 8 years of schooling); Wu/P Real Unskilled Labor Wages Deflator: CPI); Ws/P (Real Skilled Labor Wages over CPI); Ws/Wu= Ratio skilled to unskilled wages. Sources: Sanchez (1988); Ibarra (1988); Paredes (1988); Reyes (1987).

A review of the labor market data included in Table 3 suggests that: 1) the ratio Mw/Wu has increased in all the countries since 1981, thus indicating a likely important role for wage indexation; 2) the effect of the adjustment in the 1980s has created more unemployment in all the four countries, probably as a likely result of an uneven allocative job of the labor market; 3) the observed increase in the wage differential between skilled and unskilled labor

in 1980s (with the exception of Argentina) suggests that there was a positive connection with devaluation policies (Table 1)[20].

4. Statistical Results.

Tables 5a to 5d present the 3SLS estimates of the structural equations of the model for the four countries. In most cases, the results obtained with 2SLS were not statistically different from those reported, thus indicating that the correlation of errors is not an important source of inefficiency. The quality of the fit is acceptable and, in general, we obtain right signs of the coefficients.

The inclusion of public sector employment in the first equation did not yield significant results in any of the countries[21]. We also used this variable in the Wu equation -- thus assuming government uses mostly unskilled labor -- but without satisfactory results. In general, we can safely conclude that public sector employment does not affect market wages, a probable reason being that labor is hired at wages below market rates, possibly in exchange for job security.[22] Similarly, the variable ex-post indexation did not exert any significant effect in explaining the variation in Ws. The variable P_t was measured as the WPI of industrial countries multiplied by the nominal exchange rate. The variable P_n was measured through the nontradable deflators taken

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20. Note also that in Argentina there has been no increase in the real exchange rate in most of the period, thus contrasting with the experience of the other three countries.

21. The variable "fiscal expenditure" was included instead, but it did not produce significant parameters.

22. This is a hypothesis suggested for the case of LDCs in various studies (for a summary, see Fallon & Riveros,1989). In many Latin American countries it has been found that for similar skills, public sector wages are lower than the private ones [Paredes (1983); Riveros (1988), Fox(1989), Klinov (1987)].

from national accounts. The Appendix contains further explanation on the empirical data.

In both wage equations we included lagged wages to test for the effect of inertial forces, allowing us to distinguish between short and long run elasticities. In the case of the first equation we alternatively tested for the effect of prevailing labor market disequilibrium in the form of open unemployment. In all the cases this latter variable was superior, although in Uruguay it did not come out statistically significant.

The presentation of the 3SLS results in Tables 5a to 5d is based on a test on the restrictions imposed regarding homogeneity. Thus, if the restriction concerning the parameters was not satisfied statistically, the unrestricted estimate (U) is included in Table 5. The latter comprises the case of both wage equations for Chile, the formal sector wages equation for Argentina and Uruguay and the income equation for Colombia and Uruguay.

With the exception of Colombia, the estimates show the significance of Bt in the Ws equation, a variable which proxies changes in the distortionary factor associated with government and union intervention. In absence of a significant effect of ex-post indexation on nominal wage growth, the significance of Bt indicates the likely important role played by aggregate wage adjustment policies implemented by the government, as opposed to what would result from private wage bargaining.

As shown by the t- tests, the effect of changes in price of tradables on nominal formal sector wages is positive in almost all cases. Only in Colombia, the test is not significant, thus suggesting that tradable inflation would not be relevant to determine the level of nominal formal wages. With regard to the impact of price of non-tradables on formal sector wages, the

parameter is not significant only in Argentina, although the elasticity is relatively small in Chile and Uruguay. The result for Argentina can be interpreted on the basis of traditional wage policies which indexed formal sector wages to terms of trade fluctuations (Riveros, 1989). Interestingly, although the direct effect of the price of tradables on wages is relatively small in Uruguay and Colombia, the indirect effect (through the price of non-tradables) seems to compensate.

We found a positive relationship between minimum wages and Ws in all the countries, thus indicating the existence of substitution between skilled and unskilled labor in the formal sector. This implies that a decline in real MWs under relatively rigid formal sector wages will allow expansion in employment of unskilled labor and compensate for the drop in the informal sector labor demand resulting from a nominal devaluation. In general, investment[23] does not have a significant effect on formal sector wages, but in the case of Uruguay, this variable is highly significant. In all the cases, except Uruguay, lagged open unemployment significantly affects observed wage changes.

With regard to the informal sector wages equation, the results indicate that the effect of price of tradables is zero (Uruguay and Chile), positive (Colombia) or negative (Argentina). Since a parameter equal to zero implies that an increase in prices does not affect nominal wages -- thus yielding a decline in real wages in terms of tradables -- we take the latter evidence to indicate that real informal sector wages decline in terms of tradables in

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[23] This variable was expressed as a proportion of lagged income, to proxy the theoretical variable "percentage change in capital stock". This can be interpreted as the ICOR ratio, which would be proxying the theoretical variable "sectoral capital stock". The quality of the results partly reflects the nature of the proxy used.

presence of a nominal devaluation[24]. Thus, the significance test would allow us to conclude that in all cases, but Colombia, an increase in Pt implies a decline in real informal sector wages.

Only in Argentina does the variable investment seem to affect informal sector wages significantly. The poor results of the empirical model with regard to investment are probably associated with the absence of adequate indicators on sectoral capital stocks. Labor force growth negatively affects equilibrium wages in the informal sector, a result consistent with our previous expectations. However, only in the cases of Uruguay and Chile the effect of the MW on Wu is negative and significant. In the case of Argentina that effect is positive, which is a result not easy to interpret in the context of the model[25]. Finally, Ws positively affect Wu in Chile and Uruguay, thus indicating that for a given MW, an increase in Ws will cause a substitution away from skilled labor, an increase in the demand for unskilled labor in the formal sector, a decline in the effective labor supply to the informal sector, and a decline in Wu.

The direct effect of PT on wages shown in the corresponding parameter does not account for the total impact of that variable. To obtain an estimate of the total impact of changes in PT on formal and informal wages, we totally differentiate the three first equations of the system, obtaining

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[24]. In alternative specifications, in absence of the lagged unemployment in this equation, the joint test turned out to be insignificant.

[25]. Severance compensations are expressed in terms of monthly MWs in Argentina. Thus, an increase in the MW reduces normal turnover rates, not necessarily implying an increase in labor spillovers to the informal sector.

$$dW_s = \alpha_2 dPT + \alpha_3 dP_N$$

$$dW_U = \beta_1 dPT + \beta_2 dW_s + \beta_3 dPN$$

$$dP_N = \gamma_1 dPT + \gamma_2 dW_U + \gamma_3 dW_s$$

solving, we arrive at

$$\frac{dW_s}{dP_T} = \alpha_2 + \frac{\alpha_3 \left[\gamma_1 + \gamma_2 \beta_1 + \gamma_3 \alpha_2\right]}{1 - \gamma_2(\beta_3 + \beta_3 \alpha_2 + \beta_3 \alpha_3) - T_3 \alpha_3}$$

$$\frac{dW_U}{dP_T} = \beta_1 + \frac{\left[\beta_3 + \beta_2 \alpha_2 + \beta_3 \alpha_3\right]\left[\gamma_1 + \gamma_2 \beta_1 + T_3 \alpha_2\right]}{1 - \gamma_2 (\beta_3 + \beta_2 \alpha_2 + \beta_3 \alpha_3) - \gamma_3 \alpha_3}$$

Given that the variables are in rate of changes, those expressions correspond to the formal wages - price of tradables elasticity and the informal wages - price of tradable elasticity [$E(W_s, PT)$ and $E(W_U, PT)$ respectively. Both elasticities were estimated on the basis of the corresponding parameters, and the following values were obtained.

	$E(W_s P_T)$	$E(W_U P_T)$
Argentine	1.41	-0.23
Chile	1.07	0.47
Colombia	1.54	0.61
Uruguay	1.30	1.07

In general, nominal formal sector wages are more responsive to exchange rate changes. We cannot assess the statistical significance of those values, given that the distribution of both estimated elasticities is undetermined. The relativity high value of $E(W_s P_T)$ in the cases of Argentina

and Colombia -- which is probably significantly greater than one -- and of $E(W_U, P_T)$ in the case of Uruguay, which is probably equal to one -- calls our attention to problems with the basic information. On the other hand, those values are not unbelievable and have to be interpreted in a very general from. The basic conclusion obtained from this analysis is that a devaluation causes an increase in the formal/informal wage gap in all the countries; the relative real rigidity of formal sector wages, as measured by the ratio $E(W_S, P_T)/E(W_U P_T)$ is in average of about 3.

In general, the positive and significant effect of price of tradables on formal sector wages, vis-a-vis the relatively smaller one on informal wages,gives support to our contention that a segmented market produces inequitable devaluations. The only exception to this would be the case of Uruguay, where there is a relatively similar positive effect in both cases. This evidence suggests that formal sector wages are more indexed to consumer prices than informal sector wages. Data in Table 6 indicates that in fact this is the case, given that the response of skilled wages to changes in the CPI is positive and significant, while in the case of Wu it is not[26].

The estimates presented in Table 5c indicate that in the four countries changes in the aggregate income yield a significant positive effect on the price of non-tradables. In all cases the nominal exchange rate appears to affect Pn, thus also indirectly affecting wages of skilled and unskilled workers. This positive effect indicates a degree of ineffectiveness of nominal devaluations, as shown by the strong combined effect of the variable

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[26]. In addition, given that the nominal amount corresponding to non-wage labor costs is also positively correlated with inflation in the four countries, the total effect of inflation on wages of skilled labor is a function of the two respective parameters.

price of tradables and the nominal exchange rate[27]. In attempting to further investigate the causal connection of this positive effect of the price of tradables on the price of non-tradables, we estimated a more general version of the Pn equation, in which we included a cross-effect between PT and alternative measures of the labor market distortion[28]. As seen in Table 7, in all countries at least one of these cross-effects is statistically significant, thus allowing us to conclude that the presence of labor market distortions are important in explaining relatively ineffective devaluations[29]

With only the exception of Argentina -- where the MW exerts a negative effect -- the wage variables have a positive effect on Pn. In the case of Uruguay, however, none of the wage variables significantly affect the dependent variable. With regard to investment, in Colombia and Uruguay the effect on Pn is significant and with the expected negative sign.

The effect of the price of tradables in the income equation is significant in the four countries, as well as the effect of the price of non-tradables. The positive sign associated to P_T indicates the partial effect of a nominal devaluation on income. However, as long as a real devaluation is not achieved due to the effect of wage rigidities on the price of non-

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27. In another paper, we investigate the extent of ineffective devaluations based on the structure of the skilled wages equation (Lopez & Riveros, 1989b).

28. The variable MW/Wu measures the wage differential between wages of unskilled labor in the formal and the informal sector. B/Ws measure the importance of non-wage costs of labor relative to prevailing wages. The specification adopted implies that the observed effect of PT on Pn includes the impact of labor market distortions.

29. The results indicated here, as they based in an ad-hoc equation, must be handled carefully. They are only indicative of the impact of the prevailing labor market structure on ineffective devaluations. A structural test is found in Lopez & Riveros (1989b).

tradables, the effectiveness of nominal devaluation is likely to be low. The wage variables are normally accompanied by the expected negative coefficient, with the only exception of Wu in Argentina and Ws in Uruguay. The variable investment was not significant in estimating the income equation, the exception being in the case of Colombia (with 90% confidence interval).

5. Conclusions.

An adequate understanding of the process of adjustment in the presence of SLMs is crucial for better policy design. Previous theoretical analyses have shown that segmentation accompanied by indexation would yield an increase in the formal/informal wage gap in the presence of adjustment policies. This would hamper the process of labor reallocation sought by changes in relative prices of tradables to non-tradables, thus making it more difficult to achieve a real devaluation. The positive effect of a devaluation on the formal/informal wage gap implies a distributive result that may also affect the credibility and sustainability of adjustment programs.

In this paper we used a model to analyze the joint determination of wages, prices and income in a typical LDC with SLMs. The empirical result support the hypothesis that an increase in the relative price of tradables/ non-tradables will raise the formal/informal wage gap. Given that the informal sector is mostly a producer of non-tradables, while the formal sector must allow resources to move to tradable production, the predicted change in wage differentials implies difficulties in achieving a real devaluation. In fact, real formal sector wages appear to be relatively more rigid. Moreover, our evidence suggests that labor market distortions play an important role in

connection with the impact of the price of tradables on price of non-tradables.

There are some caveats in this statistical analysis, mostly derived from the approximative nature of some of our indicators. Problems are also associated with the use of yearly data to analyze an issue that for many of the countries should be tested with more continuous observations. Finally, there are problems with the model, in the sense that a more complete specification must include labor supply and demand functions and a more thorough mechanism of determination on the supply side and the trade balance. The limitations imposed by the available data and the need for a manageable model is compensated by the possibility of cross country comparisons, thus making our results more solid and discussion of the limitations more substantial.

A basic policy implication stemming from this study is that the structure of the labor market must be taken into account in the design of adjustment programs. Even if real wages are partially indexed, in the presence of segmentation a heavier burden of the adjustment would be put on the poorest segment of the labor force, making the program distributionally unfair. The effect on the political sustainability is probably as important as the one concerning the effectiveness of nominal devaluations. Deregulation of the labor market should be an essential component of macroeconomic adjustment programs, particularly with regad to indexation schemes and government intervention on wages, which reach only the formal sector of the economy. Another important implication is the need for mechanisms to accelerate inter-industry labor mobility in the adjustment, which may necessitate training and special programs to improve specific skills and

information on job opportunities. This would also reduce the social cost of adjustment implicit in increasing wage differentials, poor labor mobility and rising unemployment.

\PPENDIX: Empirical data

The macroeconomic data for the empirical analysis were obtained from standard statistical sources available in ANDREX or BESD. A list with the definitions is presented below. The only change effected in basic official figures was in the case of Chile where we used a "corrected" CPI (Cortazar & Marshall, 1979). The period of estimation is 1960-1985 but in the case of Uruguay only the period 1965-85 is considered due lack of adeuqate information on some of the labor market variables. With regard to wage data we resorted to sources containing information on skilled/unskilled workers; this information was obtained from labor force surveys, and the definition of unskilled (informal sector) workers was that of own account workers with less than 8 years of schooling; in Uruguay data used corresponded to employed unskilled labor in general. The variable B was measured through the proportion of non-wage costs associated to employment in formal sector firms. Unemployment is measured through available open unemployment rates, whose definition is similar in the four countries (namely, persons engaged in active job searching). Employment in the public sector correspond to both central government and public enterprises.

Sources of Labor Market Data:

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Definitions

G = Current Government Expenditures.
I = Gross Domestic Investment.
Money Supply (Demand Deposits and Currency in Circulation).
P = GDP Implicit Price Deflator.
PN = Non-Traded Goods Prices (Weighted Average of Services and Construction GDP Price Deflators).
e = Bilateral Real Exchange Rates vis-a-vis the US dollar using CPI as deflators.
e^1 = Multilateral Real Exchange Rate vis-a-vis top 10 trading partners using CPIs as deflators and Total Trade as weights.
T = Direct and Indirect Taxes net of Subsidies.
PT* = Industrial Countries weighted Wholesale Price Index.
X_d = Disposable Income: GDP less net taxes (T).
GDP = Gross Domestic Product at Market Prices.

Sources of Macroeconomic Data:

International Monetary Fund, International Financial Statistics.(IFS)

World Bank, Bank Economic and Social Data Base. (BESD).

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Table 5a

Structural Estimates: Wages of Skilled Labor

(3SLS)

	Constant	Bi	P_T	P_N	MW	I	$P-P^e$	U(-1)	R^2	DW	F
Argentina	-106.6	-0.741	1.78	0.994	0.448	5.650	-5.667	-0.073	0.98	1.85	---
(U)	(-1.80)	(-0.84)	(1.81)	(2.59)	(6.21)	(2.01)	(-1.42)	(-0.25)			
	-29.10	0.401	1.22	0.479	0.517	1.94					---
	(-1.14)	(1.37)	(2.68)	(5.26)	(11.63)	(1.65)					
Chile (U)	-48.89	1.096	1.39	0.240	-0.478	-0.196	-1.23	-4.782	0.97	1.98	---
	(1.35)	(4.30)	(3.56)	(-1.29)	(7.36)	(0.13)	(-1.07)	(1.75)			
	-31.68	1.218	1.09	-0.216	0.455	0.196		-3.478	0.97	2.10	---
	(-0.94)	(5.32)	(4.38)	(-1.25)	(7.06)	(0.13)		(-1.34)			
Colombia	20.69	0.045	0.26	0.919	0.156	-1.10	-0.420	-0.109	0.79	1.80	2.1
	(1.16)	(0.68)	(0.11)	(5.12)	(2.28)	(-1.07)	(-1.90)	(-1.71)			
	12.60	0.068	0.747	0.886	0.123	-0.575		-0.136	0.79	1.60	2.8
	(0.76)	(1.04)	(1.99)	(4.82)	(1.99)	(-0.60)		(-2.13)			
Uruguay (U)	-7.041a	0.242	0.98	0.366	0.605	1.345	0.664	0.077	0.88	1.76	---
	(-0.56)	(1.08)	(1.99)	(1.85)	(4.20)	(2.32)	(1.63)	(0.84)			---
	-16.20	0.056	0.919	0.414	0.656	1.492		0.184	0.87	1.72	---
	(-1.39)	(0.25)	(1.81)	(2.11)	(4.39)	(2.51)		(1.43)			

Definitions:

ad	= shift coefficient	MW	= Minimum Wage	DW	= Durbin-Watson Statistics
B_i	= Real non-wage costs of labor	I	= Aggregate Investment	$P_T{}^*ie$	= Joint Significance Test
$P_T{}^*$	= (World) Price of Tradables	p	= Current Inflation	F_{85}	= F Statistics (2SLS vs 3SLS)
e	= Nominal Exchange Rate	p^e	= Expected Inflation		
P_N	= Price of Non-tradables	U(-1)	= Lagged Unemployment Rate		

Note: Variable are expressed in rates of changes
(U) = Unrestricted Regression.

Table 5b

Structural Estimates: Wages of Unskilled Workers
(3SLS)

	B_0	P_T	P_N	W_s	I	N	MW	$W_u(-1)$	R^2	DW(h))	F_{35}
Argentina	38.84	-0.396	0.681	-0.207	1.852	-1.664	0.911	-0.579e	0.99	2.52	3.6
	(2.11)	(-2.56)	(3.59)	(-2.23)	(1.81)	(-1.83)	(12.14)	(-3.72)			
Chile (U)	-15.94	-0.268	1.512	0.125	1.174	-0.311	-0.391	0.378	0.99	1.92	---
	(-0.79)	(-0.22)	(3.48)	(1.48)	(1.18)	(-1.58)	(2.77)	(0.96)			
Colombia	-3.62	0.96	0.026	-0.082	0.375	-0.226	-0.060	0.752	0.51	n.a.	0.25
	(-0.11)	(2.15)	0.40)	(-1.67)	(0.20)	(-2.04)	(0.42)	(1.99)			
Uruguay	40.82	0.149	0.89	0.509	-1.28	-3.36	-0.949	0.140	0.59	n.a.	2.60
	(1.37)	(0.38)	(1.62)	(1.50)	(-0.62)	(-1.43)	(-2.10)	(1.10)			

Definitions:

B_0 = shift coefficient
P_T^* = (World) Price of Tradables
e = Nominal Exchange Rate
P_N = Price of Non-tradables
W_s = Wages of Skilled Labor
I = Aggregate Investment
N = Labor Force
MW = Minimum Wages
DW (h) = Durbin-Watson (Durbin h) Statistics
P_T^*+e = Joint Significance Test
F_{35} = F Statistics (2SLS vs 3SLS)

Note: 1/ = Lagged open unemployment rate
(U) = Unrestricted Regression.
t-test between buckets
Variables, defined in rate of changes.

Table 5c

Structural Estimates: Price of Non-Tradables
(3SLS)

	C_o	P_T	W_U	W_s^*	MW	I	Yd	$1R^2$	DW	F_{3S}
Argentina	-10.75	0.548	0.026	0.167	-0.241	0.112	0.796	0.99	1.85	0.18
	(0.49)	(10.96)	(0.17)	(3.45)	(-2.24)	(0.11)	(7.06)			
Chile	-4.277	0.422	0.331	-0.028	-0.219	0.034	0.287	0.99	2.14	
	(-0.75)	(5.22)	(6.04)	(-1.01)	(8.78)	(0.10)	(11.99)			
Colombia	18.86	0.619	0.273	0.062	0.046	-1.316	0.270	0.88	1.65	6.6
	(1.90)	(7.55)	(4.06)	(2.23)	(1.51)	(-2.48)	(3.66)			
Uruguay	6.584	0.735	-0.044	0.056	0.053	-0.401	0.662	0.95	1.37	2.0
	(1.14)	(9.47)	(-1.30)	(1.00)	(0.62)	(-1.36)	(2.28)			

Definitions:

C_o = shift coefficient
P_T^* = (World) Price of Tradables
e = Nominal Exchange Rate
W_U = Wages of Unskilled Labor
W_s^* = Wages of Skilled Labor plus non-wage costs of labor
MW = Minimum Wage
I = Aggregate Investment
Yd = Disposable Income
DW = Durbin-Watson Statistics
P_T^*+e = Joint Significance Test
F_{3S} = F Statistics (2SLS vs 3SLS)

Note: t-statistics between brackets
All variables expressed in rates of changes.

Table 5d

Structural Estimates: Aggregate Income

(3SLS)

	d_o	P_T	P_N	W_S	W_U	$W_{N\_}$	I	R^2	DW	F_{3S}
Argentina	3.61	0.360	0.500	-0.004	0.199	-0.056	0.031	0.99	2.18	-3.7
	(0.21)	(3.06)	(4.12)	(-0.25)	(1.73)	(-0.62)	(0.04)			
Chile	7.25	0.282	3.397	0.116	-1.103	-0.722	0.171	0.98	2.16	2.8
	(0.29)	(2.50)	(12.77)	(1.15)	(-3.94)	(-5.66)	(0.12)			
Colombia (U)	6.97	0.02	1.22	-0.109	-0.171	-0.006	0.609	0.84	2.09	--
	(0.59)	(0.61)	(6.12)	(-3.04)	(-1.70)	(0.18)	(1.32)			
Uruguay (U)	-11.40	0.113	1.244	0.003	-0.062	-0.094	0.196	0.96	1.48	--
	(-1.99)	(1.71)	(7.69)	(0.05)	(-1.62)	(-1.41)	(0.68)			

Definitions:

d_o = shift coefficient
P_T = Price of Tradables
P_N = Price of Nontradables
W_S = Wages of Skilled Labor
W_U = Wages of Unskilled Labor
MW = Minimum Wages
I = Aggregate Investment
DW = Durkin Watson Statistic
F_{3s} = F Test (2SLS versus 3SLS)

Notes: U = Unrestricted equation
t-tests between brackets
All variables defined in rate of changes

Table 5a

Wage Equations

(2SLS)

A. Skilled Labor

	Constant	B_1	$\dot{P}$	MW	I	U(-1)	R^2	DW
Argentina	-9.687	0.751	0.438	0.488	1.110	-2.21	0.99	2.69
	(-0.18)	(2.21)	(4.97)	(7.21)	(0.63)	(-0.45)		
Chile	-79.48	1.527	2.153	1.532	2.625	3.01	0.95	
	(-0.68)	(4.48)	(5.17)	(3.36)	(0.68)	(0.61)		
Colombia	22.45	0.128	0.704	0.524	-0.028	-1.59	0.69	2.30
	(0.78)	(1.13)	(2.20)	(1.47)	(-0.14)	(-1.42)		
Uruguay	-20.53	0.486	0.503	0.556	1.772	-0.863	0.89	2.13
	(0.72)	(1.32)	(2.13)	(2.91)	(2.40)	(-0.28)		

A. Skilled Labor

	Constant	$\dot{P}$	LC	I	N	MW	WU(-1)	R^2	DW (h)
Argentina	21.19	0.173	0.127	-1.28	-0.94	0.845	-0.74	0.94	
	(0.89)	(1.47)	(1.40)	(0.72)	(-1.59)	(6.39)	(-0.97)		
Chile	25.24	0.531	0.385	0.311	-5.987	-0.267	-0.40	0.97	
	(0.28)	(1.09)	(5.08)	(0.09)	(-1.91)	(0.55)	(0.47)		
Colombia	-8.865	0.561	-0.687	1.824	1.180	-0.796	0.656	0.43	
	(-0.16)	(0.91)	(-0.45)	(0.572)	(0.67)	(-1.38)	(-1.47)		
Uruguay	-10.44	0.367	0.321	0.198	-2.875	-0.494	3.167	0.46	
	(-0.96)	(0.57)	(1.42)	(0.67)	(-0.51)	(-1.45)	(0.29)		

Definitions:

$\dot{P}$ = CPI Inflation

Table 5f

Price of Nontradables: the Effect of Segmentation

(2SLS - unrestricted)

	Constant	P_T	WU	LC	MW	I	Y_d	$P_T(MW/W_u)$	$P_T(B/W_s)$	R_2	DW
Argentina	-15.89	0.109	-0.902	0.239	-0.220	0.621	0.597			0.99	1.97
	(-0.57)	(1.85)	(-0.45)	(3.24)	(-1.54)	(0.50)	(2.89)				
	-14.16	0.076	-0.175	0.287	-0.194	0.511	0.585	0.122(-1)	0.99	1.53	
	(-0.56)	(1.38)	(-0.91)	(4.16)	(1.49)	(0.45)	(3.11)	(2.90)			
	-17.84	0.081	-0.144	0.280	-0.191	0.638	(0.56)		0.115(-1)	0.99	1.52
	(-0.70)	(1.46)	(-0.75)	(4.06)	(-1.45)	(0.36)	(2.95)		(2.96)		
Chile	-3.43	0.876	0.196	0.034	0.19.	0.020	0.208			0.99	2.64
	(-0.49)	(12.06)	(2.40)	(1.33)	(6.19)	(0.48)	(4.91)				
	-2.17	0.168	0.304	0.022	0.137	-0.034	0.168	0.209		0.99	2.45
	(-0.32)	(1.67)	(2.72)	(0.79)	(2.78)	(-0.067	(3.54)	(1.38)			
	-5.59	0.468	0.163	0.045	0.182	0.188	0.214		-0.083	0.99	2.29
	0.66)	(2.71)	(1.55)	(1.27)	(5.01)	(0.29)	(4.49)		(-0.54)		
Colombia	20.64	0.270	0.213	0.071	0.061	-1.375	0.280			0.89	1.77
	(1.29)	(3.57)	(2.14)	(1.76)	(1.25)	(-1.61)	(1.5)				
	16.96	0.292	0.216	0.048	0.077	-1.105	0.289	0.064		0.91	1.56
	(0.97)	(3.77)	(2.15)	(1.34)	(1.53)	(-1.26)	(1.26)	(1.53)			
	15.67	0.426	0.166	0.161	0.030	-1.111	0.284		-0.161(-1)	0.92	1.96
	(1.02)	(2.95)	(1.67)	(1.96)	(0.57)	(-1.36)	(1.33)		(-1.23)		
Uruguay	10.62	0.770	0.016	-0.245	0.027	-0.373	0.830			0.05	1.42
	(1.09)	(1.46)	(0.19)	(0.20)	(0.19)	(-1.47)	(3.13)				
	-2.15	0.891	0.222	0.028	-0.329	-0.413	0.935	0.367		0.96	1.48
	(0.11)	(1.78)	(0.75)	(0.19)	-0.67)	(-1.44)	(3.04)	(0.77)			
	21.61	0.487	-0.014	0.068	-0.151	-0.651	0.720		0.430	0.96	1.54
		(1.63)	(0.64)	(0.42)	(-0.50)	(-1.57)	(2.41)		(0.65)		

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